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Interplay of Institutional Logics and Implications for Deinstitutionalization: Case Study of HMIS Implementation in Tajikistan

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Abstract
This document describes the efforts to reform the Health Management Information System (HMIS) of Tajikistan. The authors were involved in proposing and piloting a computerized HMIS, based on a complete overhaul of the current data collection tools. This proposal was based on experiences from a global HMIS project (called Health Information System Programme, or HISP), and advocated supporting local decision making by employing a flexible, decentralized system to collect, process, and analyze essential primary health care data. Having been a Soviet Republic for 70 years, the institutional logics underlying the current HMIS in Tajikistan were heavily influenced by the tenets of central planning, quite alien to the ideas proposed. This paper explores the institutional logics of what existed and what we proposed, and the interplay between them over the course of the project. The implications of this interplay on deinstitutionalization as an implementation strategy is sobering; first, it is clear that a complete deinstituionalization, amounting to a paradigm shift, is necessary to overcome the differences in institutional logics, but at the same time this account shows how achieving this can be a remarkable challenge in a context of strong, centralized control. This study makes some interesting contributions to the field of IS. It introduces a study from a country which until now has been almost invisible to the IS community, in contributes to the debate about bottom up and top down implementation, and provides a conceptual framework of institutional logics, their interplay and implications for deinstitutionalization.

Keywords: Tajikistan, deinstitutionalization, health information systems, institutional logic

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1 Introduction

Tajikistan is a Central Asian country about which the mainstream Information Systems (IS) and development communities have not seen anything published. Gaining independence after the downfall of the Soviet Union in 1991, the country has experienced an extremely rocky period, with a prolonged civil war and the loss of the supporting Soviet financial and social infrastructure. Unlike some of the other Central Asian countries, like Kasakhstan and Uzbekistan, Tajikistan has no oil or gas resources, and is thus not a focus of attention of either the Western nor the Russian economic decision makers. Further challenges that the country face includes an extreme climate, a long and porous border with the war-ravaged Afghanistan, a recent food and energy crisis which had huminatarian proportions (Antelava 2008), and the exodus of many trained people because of weak employment and social opportunities at home.

As in many of the other Central Asian countries, there are urgent public health problems facing the country. The demise of the Soviet economic base, followed by civil war, has led to a surge in various communicable diseases in the last two decades. According to the World Health Organization, life expectancy has decreased owing to poor nutrition, polluted water, and increased incidence of diseases such as malaria, tuberculosis, typhoid, cholera, and other cardiovascular diseases (WHO 2008).

In this context, Information and Communication Technologies (ICTs) provide interesting opportunities in the fight against these problems. For example, official statistics in 2003 quote infant mortality as low as 13.5 per 1000 live births. But since this figure does not include information about children born at home (as per UNICEF constituting about 38% of the total), estimates in rural areas report a figure of nearly 109 per 1000 live births (WHO 2008). In this context, ICTs can play a significant role in identifying the extent of births not being reported, their locations, and surrounding public health determinants of child death. Without suggesting that ICTs can solve the problem of child deaths, we argue that by providing systematic information about the identified parameters, the problem can be made visible to the decision makers, which can help more focused interventions being taken up. Without proper visibility, the problem to a large extent becomes “black-boxed” and often swept under the carpet, and not lending itself to problem-redressal actions.

Acknowledging the key role that ICTs can play in public health management, the Asian Development Bank (ADB) has established an organization called the Health Sector Reform Project (HSRP) in 2005 with the aim of creating various reform initiatives, including relating to Health Management Information Systems (HMIS). One of the authors of this paper had been invited by the ADB to participate in the HMIS related reform efforts, and he further enrolled the three other authors of the paper (Doctoral students) to create a joint team. This team then was responsible for the design, development, and pilot implementation of the national HMIS. However, carrying out these tasks was fraught with immense challenges, largely related to countering the existing institutions left behind by the Soviet legacy which favored a large manual system based on a centralized planning model. Understanding and addressing these historical conditions and trying to create new institutions based on a computer based HIS and favoring local analysis and use of information, was a key effort of the research team. This effort translated into the following two key research questions:

What are the key institutions that challenge the introduction of ICT-based HMIS reforms in the context of a post-soviet economy?

Developing theoretical concepts inspired by institutional theory to understand the nature of these challenges and how these may be addressed.

The rest of the paper is organized as follows. In the next section, we propose key theoretical concepts from institutional theory that helps to develop our analysis. After providing a brief summary of the research methods used

in section 3, the details of the case study are provided in section 4. The case analysis based on institutional theory is presented in section 4, which is followed by the concluding section on discussions and contributions.

2 Theoretical perspective: Institutional Logics and De-institutionalisation

The theoretical aim of the paper is to develop concepts that can help to identify existing institutions that shape the deployment of computer based HMIS and their associated processes. This can be seen to involve the creation and spreading of new institutions. So, what becomes important for us is to understand what are the institutional logics in play, what are the new logics being introduced, their interplay, and how these lead to specific outcomes with respect to the efforts to introduce change, conceptualized as deinstitutionalization.

Theoretically, institutional logics can be seen to represent 'sets of "material" practices and symbolic constructions which constitute a field's organising principles and which are available to organisations and individuals to elaborate' (Friedland and Alford 1991). These logics represent cognitive maps inscribing the belief systems carried by participants in the field to guide and give meaning to their activities (Scott et al. 2000). Institutional logics inscribe the 'organizing principles' that supply practice guidelines to field participants (Friedland and Alford 1991) and tap in to both the cultural-cognitive and normative dimensions of an institutional environment (Scott et al. 2000). Institutional actors, then, can be viewed as agent and carriers for producing and reproducing the logic within a specific institutional environment (ibid.).

Institutional logics are never homogeneous, and within an organization multiple logics may be simultaneously in play leading to the construction of institutional contradictions (Friedland and Alford 1991). For example, in the context of Geographical Information Systems (GIS) use in the forestry sector in India, (Sahay and Walsham 1999) elaborate on two sets of logic in play. The first concerns the logic of how foresters make decisions on forest management based largely on political and social considerations such as the minister wanting to take up water conservation activities in his political constituency. The second concerns the contradictory logic inscribed in the GIS which is based on making such decisions (of locating forestry interventions) based on scientific modelling enabled through the GIS. The interplay of these two logics, Sahay and Walsham point out, contribute to the less than effective uptake of the GIS in the forest department.

Negotiating and reconciling conflicting institutional logics may contribute to the deinstitutionalization of the existing logic and re-institutionalization of the new (Jepperson 1991). Deinstitutionalization is "a process by which institutions weaken and disappear" (Scott 2001), and "takes place when established meanings and action in an organization are discredited, either as a result of competing meanings and actions or because they are seen as failing to contribute to the institutional raison d`être" (Avgerou 2002). Further, Oliver describes deinstitutionalization as follows:

"the process by which the legitimacy of an established or institutionalized organizational practice erodes or discontinues. Specifically, deinstitutionalization refers to the delegitimation of an established organizational practice or procedure as a result of organizational challenges to or the failure of organizations to reproduce previously legitimated or taken-for-granted organizational actions" (Oliver 1992)

Oliver points out three key factors that contribute to deinstitutionalization: political, functional and social. Political pressures may evolve under threat of erosion or displacement as new and emerging practices may challenge the utility and legitimacy of existing ones. Functional presssures relate to technical or functional considerations that may compromise or raise doubts about the instrumental value of an institutionalized practice. Social pressures include increasing normative fragmentation within an organization as a by-product of other changes such as increasing workforce diversity or addressing the problem of high turnover. There can be disruptions to an organization's historical continuity (such as mergers) or changes in state laws that can prohibit or discourage the

perpetuation of an institutional practice and its associated deinstitutionalization. Apart from intentional change processes, there can be unanticipated or unintentional consequences of purposive activities leading to new institutions. For example, Hwang and Powell describe the 1986 Tax Reform Act to have unintended consequences of helping the creation of a new institutional arrangement in the form of a new industry of low income housing (Hwang and Powell 2005).

In summary, the focus of our theoretical analysis is to firstly understand what are the existing and proposed institutional logics surrounding the introduction of computer based health information systems in Tajikistan. The concept of deinstitutionalization further helps us to theoretically understand the interplay between different logics, why certain logics stay, why others erode away, and what social, political and functional pressures contribute to this.

3 Research Methods

Research approach

A useful method to develop and implement HMIS in developing countries suggested by Braa et al. is that of action research based on the principles of "networks of action" (Braa et al. 2004) They build this argument within the context of a global interaction called HISP (Health Information System Programme), which involves among other things the design, development, and implementation of a free and open source software called the District Health Information Software (DHIS) . Taking their point of departure of trying to address the commonly perceived problems of lack of sustainability and scalability of HMIS in developing countries, they draw upon Elden and Chisholm to argue for the need to carry out action research in networks rather than singular units (Elden and Chisholm 1993). Such an approach, they argue, provides the potential for multiple sites to learn with each other, share experiences and knowledge, and to plan and implement action in a context specific manner.

With this background, our action research approach approached the question of network building at two levels:
1. Global level: to examine how the global HISP network could be leveraged upon to support the process of adaptation to the local context of Tajikistan, and mutually, how the global network could learn from the Tajikistan experience.
2. Local level: Within Tajikistan, to understand what kind of socio-political, technical and health related networks could be mobilized in order to support our overall project aims of HIS related reforms.

The specific interventions that we carried out with respect to building these networks of action at the two identified levels are summarized in table 1 below.

Data collection methods

Data was collected through various means. In the very beginning of the project, an orientation was developed of the historical conditions around the HMIS, such as the prior involvement of experts and the ongoing efforts. This was done through the study of prior consultant reports, the study of existing reporting formats, and through detailed formal and informal discussions with the HSRP HMIS consultant.

In the initial situation analysis phase, seven key national level program managers were interviewed, as well as one IT expert in the MedStat program (the HMIS software currently in use), the head of the Ministry of Health task force on HMIS, and a World Bank representative who was currently involved with a (failed) HMIS reform project related to the computerization of primary records. In these interviews, basically the effort was to try and understand from the respondents their existing information needs, how that was being met (or not) from the existing HMIS, their aspirations about computerization, and their suggestions on how this could be materialized. Each of the interviews lasted about an hour and a half, during which notes were taken, later to be written up in more detail and supplemented with comments on personal opinions. All interviews were conducted in Russian, which was enabled through a translator supplied to the authors from HSRP. The translator (from Uzbekistan), though not professionally trained as a translator, was fluent in English and Russian and to the extent possible managed to enable a relatively smooth flow of conversation. Although Tajikistan has several languages, of which Tajik is currently almost universally spoken except in the mountain regions, most of the current doctors had received training under the Soviet system, and tended to use Russian as the professional language. The interviews in the district were conducted in

Tajik, for which we had no official translator. These interviews were considerably shorter and harder to conduct due to the language obstacles, although we were accompanied by a native Tajik-speaker with moderate English skills. In the absence of effective verbal conversation, a lot of interpretation was made based on the facial and other gestures of the people, for example their sense of excitement (or not) when they first saw the HMIS application.

Table 1 Intervetions and relation to Networks of Action

Action interventions carried out in Tajikistan	Global network building and leveraging	Local network building
Situation analysis: Document study, interviews, presentations, discussions	• Adopt best practises from global experience to the specific needs of Tajikistan • Gain experience from Central Asian primary health care practices	• Enroll interests in HMIS reform process • Establish local network covering the fields of health and IT • Build awareness of HMIS challenges and ways to address them
Software development: Expand functionality, database design, application translation, report generation, creating validation rules	• Adapt Global DHIS to the Tajikistan context • Advance DHIS with new functionalities developed in response to Tajikistan requirements • Enrol Tajik competence in global DHIS development • Establish a software development node in Tajikistan which could potentially serve as a hub in the future for Central Asia	• Develop a local team, committed to Free and Open Source Software Development • Develop feedback mechanisms between users of DHIS in the district and the developers • Build capacity of local team to support HSRP and also the community of users
Capacity building: Training sessions and follow-up activities in district and national level	• Adapt training material and practises from other settings to Tajikistan • Contribute to global repository of training material and examples from Tajikistan • Create training material in Russian which could be made available to other Russian speaking nations	• Formalize training procedures and content for health information officers • Develop training capacity at national and district level • Conduct orientation training to help create greater buy in and support

Another set of ongoing conversations, face to face and over the email, was carried out with our ADB partners, the head who was in Manila, and the local representative based in Dushanbe. Since they were both fluent English speakers, when present in interviews, they also helped in making translations, and for us to understand more richly the historical and political context in which a particular respondent's comments could be interpreted.

Three workshops were held. The first, with around 40 participants from the various national level health programs, statistical bureau, and HSRP staff, served as the forum for the official software launch and training, as well as discussions on broader HMIS related policy issues. The second workshop was intended for province-level staff from the five pilot regions of HSRP, but due to winter setting in, roads were closed and only staff from two regions could come. It was decided to move it to a smaller locale, where also a reliable power-supply could be secured. These experiences helped to understand the perils of travel and computer use in the bitter cold and adverse road conditions in rural Tajikistan. The third workshop successfully hosted 10 people in Kulyab, the pilot district, in a Central Asian Development Bank "e-mail center". However, this training was frequently interrupted due to power fluctuations, and

was cut short due to immense cold and the lack of indoor heating. Such experiences helped us to gain a richer context based understanding of the situation, and how this could shape HMIS implementation efforts.

Four presentations were given, to the MoH, ADB, donor partners, and a closing presentation. Feedback on these presentations as well as in the workshops was very useful as a data source. For example, in the closing presentation, where the proposed recommended measures were outlined, the director of MedStat (the HMIS division of the Ministry of Health) gave his account of the current challenges and strategies in a response to the proposed changes.

System development and prototyping, including feedback from the training sessions and workshops, was further used to gather data on HMIS requirements. It was done in collaboration with a local Internet policy agency, promoting the use of Open Source Software in Tajikistan. The local agency were very helpful in giving us tips on what to expect from the government, understand the status and capacity around free software in the country, and also to create networks with other locally based actors such as the UNICEF.

In addition, numerous informal discussions and conversations were conducted throughout the involvement, both in the capital, in the pilot province and district. Especially relevant to note is the various discussions we had with the HSRP HMIS consultant who helped us to adapt both socially and in the office, to understand to some extent the Tajik and MOH culture, and provide us with interesting historical insights into the earlier HMIS efforts in Tajikistan.

The following two tables summarize the data collection methods applied

Table 2 Overview of data collection methods

Type	Nature and volume	When
Interviews	10 at national 6 at district	Situation analysis Pilot implementation
Presentations	4, for ADB, MOH, donor partners, and closing presentation for HSRP, MedStat, and MOH	Situation analysis and end of project
Workshops	Training and discussions, 1 for national level participants, 1 for Province and district level, and 1 in pilot district for district health programs	Launch of Version 1: Tajikistan HMIS and Pilot project
Document study	Previous projects reports, Current reporting forms	Situation analysis
Informal discussions	Numerous with HMIS consultant, HSRP staff, local software developers	Daily
Participant observations	Use of MedStat software at national and district level. Study of information flows and practices around recording of data, use of registers etc.	Regularly
Data collection through emails	E-mails with HMIS consultant, software team, amongst ourselves	Continuous and ongoing
Software prototyping	During definition of datasets, creation of reports, identification of controls	Continuous and ongoing

Table 3 Interviews conducted			
Institution	Respondents	Types of issues raised	Time
Different national health programs	Deputy director or director level	Current system and its challenges, data quality, information needs, information gaps	1.5 hours
Different district health programs	District or central district hospital program directors	Information flow, use of information, reporting routines	30-45 minutes
International NGO	Country representative and HMIS representative	Past experiences of HMIS implementation in which they were involved	1.5 hours
Local software entity	Director and staff	Technical and infrastructural challenges related to software implementation	1.5 hours

Data analysis

Our analysis was broadly framed within an interpretive tradition based on trying to understand the subjective interpretations of our respondents and how inter-subjective meanings were constructed. For example, we could see that the MedStat division to some extent saw us as trying to encroach into their turf, and thus tried to emphasize the advantages of the MedStat software over DHIS. The HSRP actors on the other hand, needed to show their efforts to be a success and thus were our spokespersons to the Ministry. The local internet agency, being strong proponents of open source, saw us as agents for highlighting and strengthening the open source movement in Tajikistan. Through these various conversations, we tried to understand what were the different institutional logics in play, and which of them were dominant.

After the conclusion of the on-site involvement in Tajikistan, the authors got together in Oslo and discussed the overall empirical experience in order to understand what were the dominant analytical themes that we could individually discern. We all in different words expressed how deep the contradiction was between what we were trying to do and the institutional conditions that existed in the country. This brought us to agree that the concept of "institutional logics" and their interplay would serve as a useful lens to analyse the data. This then helped to point us towards institutional theory, especially within the realm of neo-institutionalism, specifically to develop conceptual ideas around institutional logics. Since our focus was on bringing change and in the process breaking down existing ways of doing things, we found the idea of deinstitutionalization to be relevant to our analysis.

4 Case study

The project was initiated through an invitation of a University of Oslo professor by the ADB to work with HSRP on the design, development and implementation of a computer based HMIS in Tajikistan. Early indications of the bureaucratic institutions that we would need to confront came in the process of acquiring a visa to enter the country. In short, a letter of request for visa had to be made by the inviting department (in our case, a letter from the Vice Prime Minister) to the Foreign Ministry who would then send a letter to the professor, that needed to be presented to the authorities at the airport who would stamp the passport and allow entry. Further, this letter would only be given for a duration of one month, single entry, and for further stay the process needed to be repeated. As things turned out, the professor needed to leave the country in the middle for a few days given some family exigencies in India. This created a lot of administrative hurdles in which special permission was even needed to leave the country, in which the intervention also of the Indian ambassador in Tajikistan had to be called upon to obtain necessary permissions and visas.

The project was carried out in an intensive period of about 3 months from November 2007 till early February 2008. Broadly, the project components involved an initial situation analysis and identification of local technical partner (from middle November for a month), followed by a month (till about January 22) of systems development and the pilot testing of the first prototype (called Version 1: Tajikistan HMIS), and then followed by 2 weeks of initiating pilot testing in one district (Kulyab). Since our case analysis involved the study of the interplay between the existing

institutional logic and that inscribed in the HMIS intervention efforts, the case narrative is structured in two sections: Existing situation: Institutional logics at play; HMIS intervention: Proposed institutional logics. In the following analysis section, the interplay of the two sets of logics is described, specifically with respect to their implications on deinstitutionalization.

Existing situation: Institutional logics at play:

The HMIS consultant at the HSRP office was the point of contact to understand what have been the historical issues plaguing the HMIS, what have been previous attempts towards HMIS reform, and who were the key stakeholders at the national level with respect to the HMIS. These included officials at the rank of Deputy/Director from the divisions of Medical Statistics Information Center (MedStat), Immunization, TB, Malaria, HIV/AIDS, Center for Epidemiology, Struggle against Tropical diseases, officials from the Ministry of Health (Task Group and IT Specialist), and representatives from the World Bank.

It was evident that the basis of the existing HMIS was a historical product of the Soviet health system. The central control of the HMIS was under the Medical Statistics division (called MedStat), and true to its name reflected its focus on treating the HMIS as a annual statistics generating tool. The MedStat division had an out of date software (also called MedStat) built upon a FoxPro platform which basically was capable of entering data on the existing 37 reporting forms by the facilities and generating the aggregated reports by rayons, oblasts[1] and nationally. From the 37 reporting forms, 2 were based monthly and rest annually. MedStat was not capable of generating any indicators, and for this purpose the required data was fed in separately in a WHO created program called DPS (Data Presentation System) and the generated indicators were uploaded into a national website. In addition to these above two softwares, there was another program called Factor which obtained normally by phone, data from the oblasts on 5 variables related to maternal health, and separate reports were generated. Electronically, the three programs did not "speak to each other;" despite being all under the control of the MedStat division, and the IT specialist told us that there were no further plans to upgrade the MedStat software.

However, there had been over the years some adhoc interventions by different specialists on varying aspects of the HMIS. For example, we were told that the World Bank had been involved in the computerization of the primary records, and another specialist from the West had come and suggested the use of the full blown ICD 10 system for the recording of various diseases. HSRP themselves had been involved in the redesign of some of the 37 reporting forms and making English translations and guidelines for use on some of them.

Going below the level of 37 forms, there were 367 recording forms that were used at the primary health facilities to record the basic services provided. The link between the recording and reporting forms was not at all clear, where extensive data was firstly collected in the recording forms, a significant proportion of it was not included in the reporting forms, and in fact further additional data was added on. The 37 reporting forms corresponded to different health programs (such as TB, Malaria, Infectious diseases) with a great deal of overlap and redundancies. At the rayon level, the different health programs put their respective data on the MedStat forms, which were then sent to the corresponding oblast health program, and also to the Statistical Department at the Central Rayon Hospital. Further, there were parallel reporting system in place with both the health programs and the MedStat department sending the same information to their corresponding superior level. In some cases (like the immunization program from oblast to the national level), the data was entered into a computer (say EpiInfo or Excel) and sent to the national level. However, since the EpiInfo data was seen to be incompatible with the MedStat program, the national level immunization person would take the data from the computer, put it onto paper, send that to the MedStat division who would then electronically enter the data into the MedStat program. A TB program manager described this process:

[1] Rayon and Oblast are the Tajikistan equivalents of District (typically 50.000 to 100.000 inhabitants), and Province (10-15 districts) respectively

Also, we have 16 computer specialists, but only in Kulyab and Dushanbe. But the problem is we cannot use the data from Kulyab and Dushanbe which is entered in Epi Info, because we have to adapt the data to be entered in MOH formats. So, to MedStat, we only send data on written form…this is a structure which is more than 75 years old.

Further, poor IT resources in particular health divisions further impeded the use of computerized data, as informed to us by a Deputy Director of the national TB programme:

We want to include all data in Tajikstan, but some is always missed. Now we need one IT specialist and train him full time to work on Epi Info. How we reach the 66 centers, when we have no budget, no travel money, no nothing.

Further impediments to the use of computers concerned the availability and permission to use paper. We were told paper was not regularly provided, and the limited budgets did not allow local purchase of this. For instance, in Kulyab district, we were told that the yearly budget for gasoline would be spent in just a couple of weeks of normal activity, so the purchase of paper did not assume high priority. A Tajik representative in the World Bank summed up this issue as follows:

Salary of doctors is so low – it is a privilege for the country that they are even working for us at those salaries. In this condition of poverty, it is unnatural to expect them to spend their own money on purchasing paper.

Given the paradoxical situation where paper was not available, and that every month reports needed to be sent involving literally hundreds of pages, we were told that "inventive" local solutions were found to fulfil the routine reporting requirements. A senior official of a donor agency narrated to us his experience of how reports were constructed at the local level:

When asked how the reports were prepared, he (a doctor at the Rayon level) said he will tell (about how reports were prepared) if his name is not quoted. He said, he bought one chocolate to the room of the specialist responsible for the data. The Specialist generated the report for the whole district. We (the aid agency official) told [the director of MedStat] that this is the cost of your reporting system – one bar of chocolate.

While on the face of it, the information flows may have seemed "irrational," it could be seen to inscribe the deep rooted hierarchical authority structures and centralization. For example, we found that the mother health program at the Oblast level first sent their data in the their MedStat forms to their superior level at the national level, who would then approve it and send back to the originating source at the Oblast. This person would then send the approved data horizontally in the same MedStat forms to the oblast MedStat centre, who would then send the data to the national level MedStat centre.

Given the huge size of the data to be reported upon (about 30,000 data elements) on a routine basis, the extremely poor HMIS related resources, and that reporting was seen as an irrelevant exercise, data quality was an obvious victim. The head of the HMIS task force at the MOH admitted that the use of the ICD 10 codes for classification was fraught with errors, and he estimated that 35% of the data in this system would be incorrect from classification errors itself. In a modification of Winston Churchill's famous expression on statistics, a senior official of the Republican Center for Immunology commenting on the quality of the immunization data said:

I believe, the first lie is statistics, second lie is statistics and the third lie is statistics.

The reporting forms were clearly poorly designed and were comprised of multiple sub forms. To give an example, we found one form (No 30) titled "Treatment Prophylactic Activity of Facility" to contain about 50 sub forms,

covering 1836 data elements, and spanning about 75 pages. To deal with this "gigantomania" of forms, sub-forms and data elements, we found that many health programs had created intermediate forms, designed locally for their local use, while still keeping up the facade of complying with the MedStat reporting forms. For example, the National immunization program manager said that while they sent the MedStat form, they have another form for immunization (which was one page long) that they used for their internal purposes. In another example, we were shown how a list of 350 items fulfilled the information needs to run a central district hospital. To comply with the official system, this information was entered into their corresponding MedStat forms, representing only 2.5% of the total cells there. A further example was provided by the Infectious diseases department at the central district department which they called an "emergency form." In this form (see picture below), 8 essential diseases were listed (and spaces left for others), and were reported by the different rural health centres (shown as columns). This form was used for local purposes in addition to the standardized recording and reporting forms (prepared for national reporting).

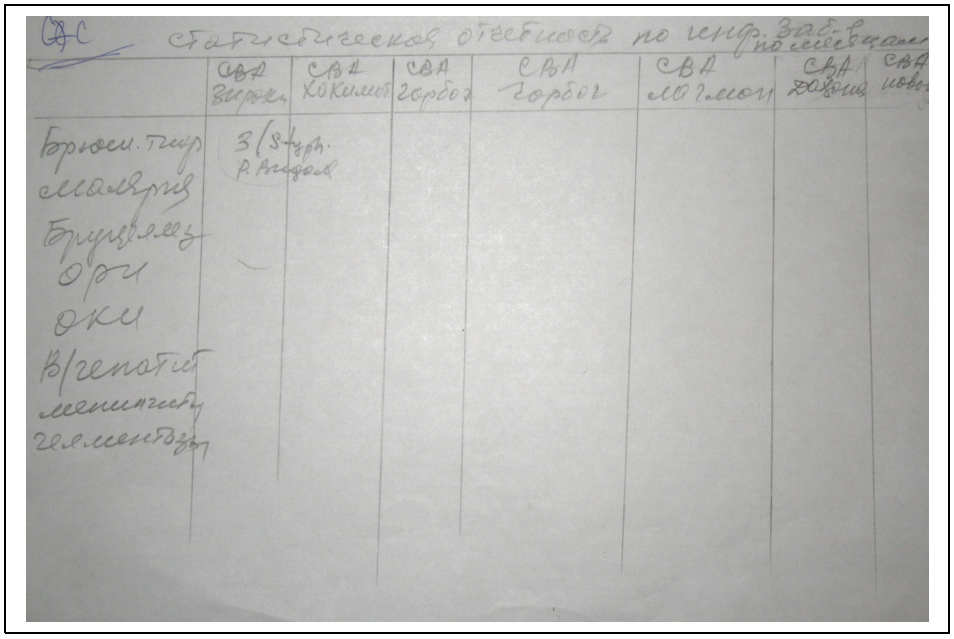


Figure 1 Emergency form on infectious diseases

Summary of the existing institutional logics that we identified include:

- Central planning for statistics management (supporting curative rather than preventive health).
- HMIS as annual statistics generating tool.
- "Gigantomania", collection of extensive data signals seriousness and scientific vigour.
- Computers can be employed to automate paper-based systems.

HMIS intervention: Proposed institutional logics

The proposed HMIS was customized by a team of Doctoral students using the shell of a free and open source HMIS application designed and developed under the HISP network involving developers in Oslo and other HISP nodes (such as India and Ethiopia). A first step in the design process was the creation of "data sets" and the corresponding "data elements." We carried out a mapping exercise in which we first detailed out all the forms, the sub forms and the data elements contained in these different groups. We then suggested that instead of thinking of forms, we must consider relevant health related categories, and map the data into these categories. Further, we suggested that there should be two broad categories of routine data (reported once a month) and semi-permanent data (reported annually).

We found 6 categories to cover all the routine data and 3 categories for semi-permanent data. The Table below summarizes this exercise:

Table 4 Categories of data and which MedStat forms they come from	
Routine health data	Category 1: Infectious diseases (From forms 1.1, 1.2, 1.3, 7, 16.4) Category 2: TB (Forms 1.8, 8, 33.1, 33.2. 33.3. 33.4. 33.5. 33.6, 33.7, 45.3-45.8) Category 3: Mother health (Forms 5.1-5.5, 12A.1, 12A.2, 12 O, 13, 32.1- 32.6) Category 4: Child health (Forms 2.1-2.2, 31.1-31.6, 41,3, 41.4) Category 5: Mental health (Forms 10, 11, 37.1, 37.2) Category 6: Departmental/inpatient activity: (Forms 7H.1-7H.2, 14.1- 14.3, 16.3, 20.1, 20.2, 30.3-30.4, 30.4.3-30.7, 39.2-39.7, 40.2)
Semi permanent data	Category 1: Infrastructure: Medical equipment: (Forms 30.1.1, 30.1.2, 30.1.3, 30.1.4, 30.1.6, 30.1.7,34.1, 34.2, 34.3, 44.2) Clinics: (Forms 45.2, 47.3 -47.17, 47.22-47.24) Category 2: Human resources: Staff: (Forms 10A.1-10A.2, 16.1, 16.2, 17A.1-17A.2, 17.1-17.3, 20.3, 30.2, 30.4.2, 39.1, 40.1, 41.1, 41.2, 42.1, 44.1, 45.1, 71.1, 71.2) Posts: (Forms 47.1, 47.2, 47.18-47.21) Category 3: Community status: (Forms 12, 15, 35, 36.1-36.4)

Furthermore, we suggested a radical reduction of data to be collected, and a shift to indicators (rates and ratios), rather than just data elements (counts). A smaller system would have positive impact on both time consumption for data entering and ambiguities related to correct use, and hopefully help to improve the level of data quality. Shifting the focus from counts to indicators, the data would assume relevance for decision making across time and space.

However, when we presented our proposal for redesign based on data sets (and not forms), it was rejected as we were told that "the Central Statistics Authority has approved the existing 37 reporting formats, and we are not even allowed to change or add a logo to the form." So, leave aside implementing a proposal involving a radical redesign, we were not even allowed to change the location of a single piece of data in the existing formats. We thus then made a design decision that we would take each of these reporting forms to each represent a data set, and have groups defined within each of them, each corresponding to a sub form. So, our design approach ended in developing a maximum data set (rather than a minimum data set), and we rationalized this (rather unpleasant decision of automating existing inefficiencies) by telling ourselves that through this approach of one-to-one automation would help us in the first place to get the existing data into the computer. This could then be followed up with a process of analysis of existing data, making visible the poor quality of existing data to the planners, and with this make a stronger argument for applying our minimum data set approach in the next iteration. But, as the World Bank representative told, a smaller system was not seen compatible with central planning, and he was skeptical about chances of our success:

> *"We wanted to simplify the system, when the consultant showed the MOH a system with 15 indicators, they laughed, how can it meet the needs of the health system? They laughed and did not accept it. This is the paradox – we want a huge system, but don't have the money. They are suspicious of small systems"*

To add more observations from the process of system development, the issues of translation and control rules are worth mentioning. During translation, the system went through the process of customisation into two languages – Russian and Tajik. Technically this task went with little or no difficulty, but it did create a big confusion in the literal meanings and translation of medical words and disease names to Tajik. The professional language (for Medicine) even for the local people of Tajikistan is Russian, and for example there is not yet an ICD10 translation to Tajik. For a range of health conditions, there are no standard Tajik names, with a multitude of descriptions used locally in addition to Russian.

With respect to controls, the tabular forms in MedStat required many data items to be recorded twice. For each row item, such as Malaria, there would be columns both for age groups and gender, and also a column for the total. Data would then appear twice, both in a specific age-group, and in the total. In DHIS, data items can be set to be calculated automatically by aggregating other items, so that totals could be produced on demand. Thus, we argued, the need to enter them disappears, and they can be removed from the data entry screen. In the case of MedStat, where total-items typically constitute ten percent of all data items, it could mean the removal of 3000 items to be filled in. However, this was not to be implemented, as it was still in the MedStat administration's intentions to manually enter totals, and then run checks on them against their various components. This had been included in the MedStat software with a set of so-called controls. These controls made sense in a paper system, where manual aggregation into totals could produce errors. This "paper verification logic" was applied on a one-to-one basis to a computer system where the possibility of manual aggregation error could be eliminated altogether. Instead of removing the system of manual aggregation, and go for automatically calculated totals, the development of the same set of controls in DHIS as in MedStat became a compulsory requirement from the MedStat team.

Summary of the HMIS intervention related institutional logics that we identified included:

- Decentralized decision making based on routine data.
- HMIS is indicator- and action-led.
- Small, essential data sets best supports action and improves data quality.
- Computer systems should be employed to internalise routine aggregation, increase flexibility, and decrease response-time to changes in epidemiological information needs.

5 Analysis: Interplay of logics and implication on deinstitutionalization.

In the case study, we have tried to elaborate upon the institutional logics which we found to be in play through conducting the situation analysis of the HMIS in Tajikistan, and also the logics which we believed were inscribed in the HMIS related intervention that we were seeking to introduce. In this analysis section, we will describe the interplay of these two sets of logics, and how this shaped the process of deinstitutionalization that we were seeking to bring about in the existing HMIS. Specifically, we discuss two sets of interplays:

1. Statistics for central planning and control versus using information for decentralized action.
2. Rigidity of paper based reporting formats versus the flexibility of electronic customizable forms.

We now elaborate on both these sets of interplays.

1 Statistics for central planning and control versus using information for decentralized action

The Tajikistan system is a historical product of a Soviet system of governance, and nearly 2 decades after the breadown of the USSR, the deep rooted Soviet institutions can still seen to be in play. In another context of collectivization (before the Second World War), this has been described by Scott as "gigantomania," referring to the focus on trying to collect huge amounts of data as a form of centralized planning and control (Scott 1999). In the post-Soviet system in contermpary Tajikistan, we still see strong elements of this giagantomania in the health system. For example, the routine health system seeks to collect data on more than 30,000 data items on all kinds of diverse items such as soil samples, aeroplane vibrations, cigarrete smoking in addition to health programs. When this magnitude of data collection for a country of about 7 million population is compared with the Indian system (catering to a population of more than a billion) which collects about 3000 items of data routinely, the sheer size of the system is magnified.

Further, the Soviet system is acknowledged to pride itself to be based on a strong scienctific foundation. This historical tendency is reflected in the Tajikistan's MOH decision to use the full blown version of the ICD 10 system.

The implication of this was each disease was classified by various codes, and each code had various sub codes and sub-sub codes. For example: Acute paralytic poliomyelitis (ICD10 A80.1-3), which was divided into "Associated with vaccine (A80.0)", "Provoked by wild type virus (A80.1-2)", and "Other and not precise (A80.3)". Like this, there were literally thousands of examples.

Even though a high percentage of the codes were reported as zero, and there were huge amounts of overplaps and duplications, the Tajik officials prided themselves on the use of the system as it was associated with a high level of scientific expertise. In the Soviet era where in the central system there was a high level of scientific and technical experts, the data collected from the peripheral levels was subjected to a serious scientific scruitiny. However, now at one level the scenario had changed with the level and numbers of experts in the central system dramatically reduced with the fall of the Soviet Union, while at another level the same kind of practice had continued (of large amounts of data flowing to the central level). So, now while similar levels of detailed data was expected to be collected, there was a simultaneous decrease in the capacity to both collect good quality data and also the skills to analyze and use the data.

In contrast to this existing system, the HISP philosophy towards HMIS development can be seen to be a historical product of post-apartheid 1994 South Africa, a period of ANC driven reform based on an agenda that emphasized decentralization and integration (Braa and Hedberg 2002). Coming out of Apartheid, the health system was characterized by extreme fragmentation where health care delivery was organized by colour and creed. The reform process then sought to integrate these disparate systems and simultaneously decentralize decision making. The HISP project within this context sought to develop free and open source software which could be installed at the local levels, and large scale capacity building programs would be carried out to empower the health workers and making them use "information for local action." These principles and practices of the HISP initiative were inscribed into the design of the software (DHIS -which empasized local flexibility and user control), and became part of the training material used for processes of capacity building of the health staff. These principles, materials, artefacts (the free software) then started to circulate through the HISP network by various means, such as the movement of HISP staff across nodes, the sharing of software and of training material. This circulation also found its way to Tajikistan.

The ideology of using information for local action became a buzzword in the entire HISP network, and was tried to be adapted in various context with varying degrees of success. While this was successfuly translated for other provinces in South Africa, in countries like Cuba where the system was centrally controlled (by Castro), these principles could not be successfully adapted (Sæbø and Titlestad 2004), In countries like Mozambique where the capacity at the local level was weak, it was also difficult to apply these principles in local settings. Through the medium of the Oslo professor who was invited by Tajikistan, the existing HISP ideology, principles and artefacts was also introduced to Tajikistan and discussed in presentations and written reports.. For example, a key part of the situation study was to develop the argument that too much data was being collected, a high proportion of the data was blank, the data was only flowing upwards, and no use of it was being made at the local levels to help improve local service delivery.

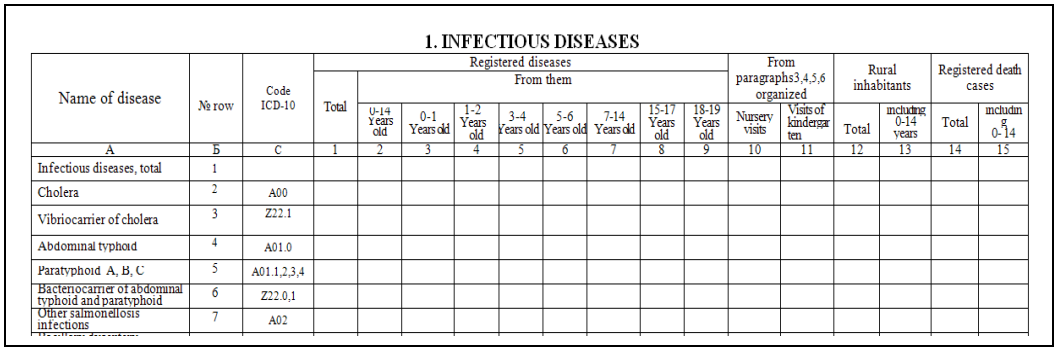
However, adapting these principles of use of information for local action would involve the incorporation of a whole range of HISP principles, including the creation of a minimum data set, linking data being collected with indicators, and large scale capacity building programs of the health staff with a focus on the use of information. However, we soon realized that these aims were unattainable in the present scenario. Firstly, no permission could be obtained to make any changes, even the removal of duplicate data elements that were included in the same form. Further, the system we found was not mature to absorb the shock of these large scale and radical changes. Since even the basic information processing systems were not in place, such as for collecting quality data, it was too ambitiuous to expect local staff to start on the analysis of data. There were further constraints such as the poor capacity of the health staff,, very weak infrastructure (eg lack of power in the peripheral areas), and the extreme climatic conditions which made it difficult to travel to the districts to carry out the training programs.

The interplay of the two sets of logics thus resulted in our adapting a strategy of mainting the status quo in terms of their reporting forms, their numbers and design, but translating this status quo into an automated form. The reasoning being that by the analysis of the information inscribed in this status quo system, we could make visible the poor quality and the absurdity of the current design. This we believed would help us to make a stronger case for change in the future, and when changes would be approved we could be able to easily adapt it to the flexible DHIS based HMIS application. Not the best solution, but this was the best we could construct given the circumstances and the limted time frames.

2 Rigidity of paper based reporting formats versus the flexibility of electronic customizable forms

For both institutional and technical reasons, the paper formats which were in use were inscribed with a deep sense of rigidity. Institutional reaons consisted of the costs associated with the production of new formats, the logistics problems of their reproduction and distributing them to the hundreds of facilities, some of which were located in geographically inacessible regions. The size of the individual forms, some of which even ran up to 100 pages, made the task of changing a paper based form extremely daunting. Further, we were constantly reminded that the existing forms had only recently been approved by the Central Statistical Authority, and so no further changes could be made for at least 5 years which corresponded to the national planning cycle. The technical reason contributing to the rigidity of the form was the very clutterred design which was full of multiple rows and columns. For example, some of the forms had about 250 rows and 12 columns, which would have been very difficult to modify in technical terms.

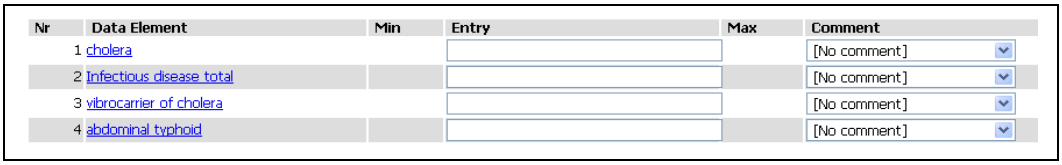
Bathed in the philosophy of flexible systems and local action, HISP saw forms as something very flexible which could be modified at will based on user needs. The entire software had been built on a modular structure, and changes could easily been made at the data entry level without affecting other parts of the system. Furthernore, some technical innovations were created by the software development team, specifically concerning the "multi-dimensional" data element to replace the existing uni-dimensional data element. Through this innovation, previously existing multiple uni-dimensional data elements (for example, children in different age categories which would be treated as different elements) could now be treated as a single data element (children) having mutliple categories (representing age groups). This innovation was further combined with another development of a customized data entry screen by which the data entry could be done on the screen which replicated the paper form, as contrasted to data entry through a list of data elements organized vertically. The screen shots below illustrate the two systems of data entry. The combination of these two technical innovations provided us with a great deal of flexibility in the design of the forms.



1. INFECTIOUS DISEASES

Name of disease	№ row	Code ICD-10	Registered diseases									From paragraphs3,4,5,6 organized		Rural inhabitants		Registered death cases	
			Total	From them													
				0-14 years old	0-1 Years old	1-2 Years old	3-4 Years old	5-6 Years old	7-14 Years old	15-17 Years old	18-19 Years old	Nursery visits	Visits of kindergarten	Total	including 0-14 years	Total	including 0-14
A	Б	C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Infectious diseases, total	1																
Cholera	2	A00															
Vibriocarrier of cholera	3	Z22.1															
Abdominal typhoid	4	A01.0															
Paratyphoid A, B, C	5	A01.1,2,3,4															
Bacteriocarrier of abdominal typhoid and paratyphoid	6	Z22.0,1															
Other salmonellosis infections	7	A02															

Figure 2: Form 1 customized data entry form, english version



Nr	Data Element	Min	Entry	Max	Comment
1	cholera				[No comment]
2	Infectious disease total				[No comment]
3	vibrocarrier of cholera				[No comment]
4	abdominal typhoid				[No comment]

Figure 3: Form 1 with data elements listed vertically in standard layout

The interplay of these two logics came in when we started to make suggestions in the design of the screens, showing how space could be used better, or by making aesthetic based improvements (such as the use of logos and maps). However, the argument of no permission for changes was used to shut out our requests. When we started to say that we could try out some new designs on an experimental basis and change over easily if it did not work, it was still no go.

Interplay of logics and implications for deinstitutionalization

As Oliver has pointed out that deinstitutionalization arises from pressures relating to social, political and functional. These pressures, if gaining adequate momentum can create a sense of dissensus in the existing institutions and provide the impetus for the dissipation or erosion of existing institutions. In the case described, the interplay of the institutional logics could demonstrate a great deal of functional dissensus and how the existing system was operationally inefficient, based on poor quality data and providing data which could not be used. We demonstrated this functional deficiencies through out analysis, for example through showing that in some of the forms nearly 90% of the data was being reported as zeros or blanks. We also argued that while a huge amount of data was collected, no indicators were being used. However, the Ministry of Health just flatly refuted our claim and just said that no data was being collected that was not being used as an indicator. When examples were shown by us to the contrary, they were just brushed away as being exceptions.

A degree of social pressure had been placed on the MOH to reform their HMIS through efforts of the World Bank and ADB that had created specific structures (like the establishment of the HSRP office) for guiding reform efforts. However, since the HSRP was an independent structure, and had a time bound life (of 3 years), their reccomendations were not binding on the MOH to accept. However, on the political front, we failed to create adequate momentm and pressure to trigger change. The political decision making centre was at the MOH who were closely aligned with the MedStat, and our influence on that was minimal. Our alignment was with the ADB who were primarily considered as a donor (that too in the form of loans), and thus not sifficently powerful to enforce change.

In summary, it could be seen that the interplay of logics primarily intersected on the functional domain, and confronted with a strongly historically embedded system, could hardly make a dent on the political domain. However, what we succeeded to do was the creation of some seeds of change, firstly by creating a system that had an inscribed flexible logic which could be modifed into a more effective HMIS in the system in the future (when the political conditions would be more favorable). Another gain could be the fact through our various reports and presentations, we had introduced new discourses into the HMIS reform efforts, such as related to use of information, the use of indicators, and data quality and validation. So, while some seeds for deinstitutionalization had been planted, adequate political pressure could not be created for deinstitutionalization to take place in practice. This also emphasizes, institutional change processes are painfully slow.

7 Conclusions

The interplay of the two sets of logics basically involved two different paradigms which at one level were irreconciliable and could not coexist. However, we believe that in such a historically embedded system, a paradigm shift would only come about if mandated explictly from the top political authority – the health minister. While local level incremental efforts may be useful to create some local expertise and knowledge, the lower levels have really no

authority or voice to influence change. The strategy of local empowerment which had worked for the HISP project in South Africa, was a product of the historical moment that existed, one arising from the breakdown of the apartheid system and the political agenda that mandated decentratization and integration.

This study makes some interesting contributions for the IS field. Firstly, it brings into the map a study from a country which till date has remained nearly completely invisible to the IS community. Secondly, it contributes to the debate about bottom up and top down implementation models by arguing that such decisions are products of historical circumstances, and bottom up may not be always most effective even though ideologically appealing. Thirdly, the conceptual framework of institutional logics, their interplay, and implications for deinstitutionalization, provides an interesting approach to study implementation experiences more broadly, not just HMIS in a post-Soviet republic. In other cicumstances, there would be different forms of logics would be in play, and studying them would provide rich insights into the implementation dynamics.

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